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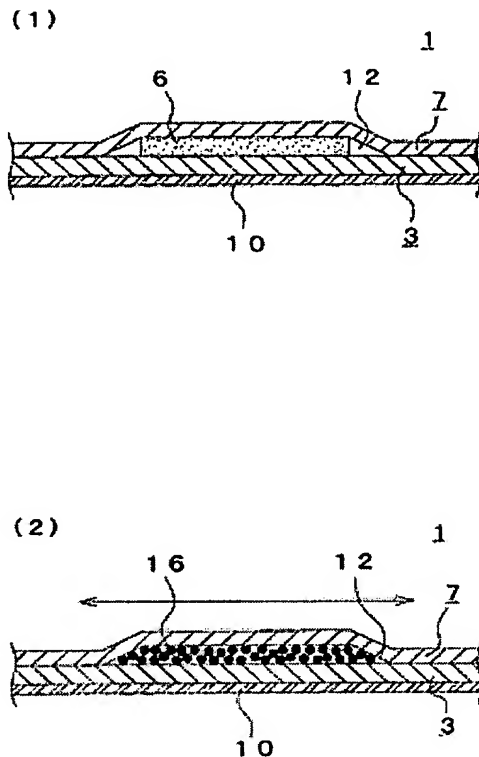
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**Abstract:**

**PROBLEM TO BE SOLVED:** To provide a heat generation structure having small shape change after heat generation. **SOLUTION:** The heat generation structure 1 comprises: a first sheet 3; a heat generation body 6 placed on an upper surface of the first sheet 3; a second sheet 7 adhered to the first sheet 3 in a state that it covers the heat generation body 6; and an adhesion layer 10 coated on a lower surface of the first sheet 3. A gap 12 having 10% or more volume of the heat generation body 6 is formed on an edge of the heat generation body 6. Thus configured, the heat generation body 6 is broken by hardening due to oxidation reaction to generate a plurality of lumps 16 and, even when an apparent full volume of the lumps 16 increases in comparison with the heat generation body 6, the increase is contained in the gap 12. That is, since the whole lumps 16 spread in the horizontal direction, a phenomenon for expanding the first sheet 3 and the second sheet 7 up and down comes to occur less frequently. Consequently, an uncomfortable stiff touch occurring to a pasted part after heat generation is reduced.

**JPO Machine translation abstract:****(57)Abstract**

**SUBJECT** The degree of the shape change after generation of heat provides little heating structure.

**Means for Solution** The heating structure 1 comprises the 1st sheet 3, the 2nd pasted-up sheet 7, and the adhesive layer 10 applied to a lower part side of the 1st sheet 3, where the 1st sheet 3, the heating element 6 arranged in the upper face of the 1st sheet 3, and the heating element 6 are covered. The crevice 12 which has a volume of ten percent or more of volume of the heating element 6 is formed in a periphery of the heating element 6. If constituted in this way, even if the heating element 6 breaks by hardening by oxidation reaction, two or more lumps 16 are produced and the lump's 16 whole appearance top product increases compared with the heating element 6, an increased part will be settled in the crevice 12. That is, since the lump 16 whole diffuses horizontally, a phenomenon which extends the 1st sheet 3 and the 2nd sheet 7 up and down is reduced. As a result, displeasure made into GOTSUGOTSU produced to a part to be stuck after generation of heat is reduced.

**Chosen drawing** Drawing 3

**Claim(s)****Claim 1**

It is the heating structure used sticking on parts, such as the skin, to be stuck,  
The 1st sheet-shaped sheet,

A plate-like heating element which generates heat, hardens and produces two or more lumps by crack by **of said 1st sheet** being arranged on a field on the other hand, and contacting air, The 2nd sheet pasted up on said 1st sheet where it is sheet shape, it has breathability and said heating element is covered,

It has an adhesive layer formed on an another side side of said 1st sheet,

Heating structure in which space which becomes ten percent or more of the volume of said heating element was formed in a periphery of said heating element.

#### **Claim 2**

The heating structure according to claim 1 in which said heating element was formed so that all the angles might have a curvature radius of 0.5 mm or more.

#### **Claim 3**

The heating structure according to claim 1 or 2 which has the truncated four-sided pyramid shape to which said heating element uses said 1st sheet side as the bottom.

#### **Claim 4**

From Claim 1 to the heating structure according to claim 3 in which said 1st sheet and said 2nd sheet have elasticity

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## **Detailed Description of the Invention**

### **Field of the Invention**

#### **0001**

About heating structure, especially this invention includes a heating element and relates to the heating structure used sticking on parts, such as the skin, to be stuck.

### **Background of the Invention**

#### **0002**

It is used in order to stick on the skin directly and to carry out a warm temperature therapy to it, and the exothermic extensible body expanded and contracted so that a motion of the body of a joint part etc. may be followed is proposed.

#### **0003**

Drawing 5 is a top view showing the outline composition of the exothermic extensible body shown in the patent documents 1.

Drawing 6 is a sectional view of the VI-VI line shown by drawing 5.

#### **0004**

With reference to these figures, the exothermic extensible body 61 comprises the 1st sheet 3, the 2nd pasted-up sheet 7, and the adhesive layer 10 applied to the lower part side of the 1st sheet 3, where the heating elements 6a-6c etc. which have been arranged in the upper face of the 1st sheet 3 and the 1st sheet 3, the heating elements 6a-6c, etc. are covered.

#### **0005**

The 1st sheet 3 pastes together the elastic nonwoven fabric 4 and the elastic air-impermeable film 5 with adhesives etc., and is constituted as a composite sheet which has elasticity. The 2nd sheet 7 is also constituted as a composite sheet which pastes together the nonwoven fabric 8 and the air-impermeable film 9, and has elasticity similarly. This 2nd sheet 7 is provided with breathability by two or more detailed holes formed in the film 9 all over almost with the needle etc.

#### **0006**

It consists of mixtures, such as iron powder, mineral salt, activated carbon, and water, for example, and iron oxidation reaction begins and generates heat by contact with air, and each, such as the heating elements 6a-6c, is **tabular of a plane view \*\*\*\* square**, and is arranged in the upper face of the 1st sheet 3 in the state where it aligned in the shape of a lattice in all directions.

#### **0007**

The 2nd sheet 7 is arranged so that these heating elements 6a-6c may be covered without a crevice, and the periphery edge and periphery edge of the 1st sheet 3 of each other are heat sealed (heat adhesion). The adhesive layer which a binder is applied and is not illustrated is formed in the portion except the periphery edge of the lower part side of the 2nd sheet 7. The 1st sheet 3, the 2nd sheet 7, the heating elements 6a-6c, etc. are stuck and unified.

#### **0008**

The binder 10 is applied to the direction outside the nonwoven fabric 4 of the 1st sheet 3. The releasing paper 11 is stuck so that this applied binder 10 may be covered, and the adhesive layer 10 is protected till use.

**0009**

The packing sheet tools which use Cairo as the same purpose as such an exothermic extensible body are also proposed (patent documents 2).

**Patent documents 1** JP,2006-51191,A

**Patent documents 2** JP,H6-26829,U

**Description of the Invention****Problem(s) to be Solved by the Invention****0010**

Drawing 7 is a mimetic diagram showing the deformation process by use of the exothermic extensible body shown by drawing 5.

**0011**

With reference to (1) of drawing 7, in the exothermic extensible body 61 before generation of heat, the heating element 6 is plate-like and the 1st sheet 3 and the adhesive layer 10 which touch a part to be stuck are maintaining the even state.

**0012**

With reference to (2) of drawing 7, in the exothermic extensible body 61 after generation of heat, the heating element 6 broke by oxidation reaction, two or more lumps 16 were produced, and the crevice has arisen between the united heating elements 6 before generation of heat. As a result, the lump's 16 whole appearance top product increases compared with the heating element 6, the 1st sheet 3 and the 2nd sheet 7 can extend it up and down with the lump 16, and unevenness produces it in the 1st sheet 3 and the adhesive layer 10 which were in the even state.

**0013**

Thus, in the conventional exothermic extensible body, in order that the lump which arises from a heating element might extend the 1st sheet and the 2nd sheet and might change the shape of an exothermic extensible body after generation of heat, it had become an unpleasant thing which makes a part to be stuck produce the sense of incongruity as for which a feeling of GOTSUGOTSU becomes. A sheet will generate this displeasure similarly, even if inelastic.

**0014**

This invention was made in order to solve above SUBJECT, and an object of an invention is for the degree of the shape change after generation of heat to provide little heating structure.

**Means for Solving the Problem****0015**

In order to attain the above-mentioned purpose, the invention according to claim 1, Are the heating structure used sticking on parts, such as the skin, to be stuck, and The 1st sheet-shaped sheet, A plate-like heating element which generates heat, hardens and produces two or more lumps by crack by **of the 1st sheet** being arranged on a field on the other hand, and contacting air, It is sheet shape, and it has breathability, and has the 2nd sheet pasted up on the 1st sheet where a heating element is covered, and an adhesive layer formed on an another side side of the 1st sheet, and space which becomes ten percent or more of the volume of a heating element is formed in a periphery of a heating element.

**0016**

If constituted in this way, two or more lumps which arose from a heating element will be settled in space of the periphery of a heating element.

**0017**

As for the invention according to claim 2, in composition of the invention according to claim 1, a heating element is formed so that all the angles may have a curvature radius of 0.5 mm or more.

**0018**

If constituted in this way, all the angles of a heating element will become round, and external force added to an angle will distribute.

**0019**

The invention according to claim 3 has the truncated four-sided pyramid shape to which a heating element uses the 1st sheet side as the bottom in composition of the invention according to claim 1 or 2.

**0020**

If constituted in this way, a heating element will serve as truncated four-sided pyramid shape

as for which the bottom of a side stuck becomes larger than the upper surface.

**0021**

In composition of the invention according to any one of claims 1 to 3, as for the invention according to claim 4, the 1st sheet and the 2nd sheet have elasticity.

**0022**

When constituted in this way, the whole heating structure has elasticity.

**Effect of the Invention****0023**

As explained above, two or more lumps which arose from the heating element since two or more lumps which produced the invention according to claim 1 from the heating element were settled in the space of the periphery of a heating element stop extending the 1st sheet and the 2nd sheet up and down, and the feeling of GOTSUGOTSU to a part to be stuck is reduced.

**0024**

Since the external force added to an angle by all the angles of a heating element becoming round distributes in addition to the effect of the invention according to claim 1, the invention according to claim 2 becomes difficult to lack the angle of a heating element.

**0025**

Since a heating element serves as truncated four-sided pyramid shape as for which the bottom of the side stuck becomes larger than the upper surface in addition to the effect of the invention according to claim 1 or 2, the invention according to claim 3 becomes difficult to break a heating element.

**0026**

Since the whole heating structure has elasticity from Claim 1 in addition to the effect of the invention according to claim 3, heating structure becomes easy to follow the invention according to claim 4 at a motion of the crooked parts, such as a joint part, to be stuck.

**Best Mode of Carrying Out the Invention****0027**

Drawing 1 is a top view showing the outline composition of the heating structure by a 1st embodiment of this invention, and drawing 2 is a sectional view of the II-II line shown by drawing 1.

**0028**

The heating element 6 in which the heating structure 1 has been arranged with reference to these figures in the upper face of the 1st sheet 3 and the 1st sheet 3, Where the heating element 6 is covered, it comprises the 1st sheet 3, the 2nd sheet 7 heat sealed, and the releasing paper 11 stuck on the undersurface of the adhesive layer 10 and the adhesive layer 10 applied to the lower part side of the 1st sheet 3.

**0029**

The 1st sheet 3 is constituted as a composite sheet which pasted together the elastic nonwoven fabric 4 and the elastic air-impermeable film 5 of a urethane system of the urethane system with adhesives etc., for example. The 2nd sheet 7 also pastes together the same nonwoven fabric 8 and the air-impermeable film 9, and is constituted as an elastic composite sheet. This 2nd sheet 7 is provided with breathability by two or more detailed holes formed in the film 9 all over almost with the needle etc. Although breathability or air-impermeable any may be sufficient as the 1st sheet 3, let it be an air-impermeable sheet by this embodiment. Although the size of the heating structure 1 can be arbitrarily set up according to a part to be stuck, in this embodiment, the size of 50 mm and the cross direction (longitudinal direction in drawing 1) is set as 120 mm in the size of the longitudinal direction (sliding direction in drawing 1).

**0030**

All the angles are tabular **of the plane view rectangle which has a curvature radius of 0.5 mm or more**, and the heating element 6 is arranged in the upper face of the 1st sheet 3. Dip  $L_1$  of the heating element 6 is 30 mm, breadth  $W_1$  is 40 mm and thickness  $H$  is set as 2 mm.

**0031**

When constituted in this way, all the angles of the heating element 6 become round, and since external force distributes, the angle of the heating element 6 becomes difficult to be missing.

**0032**

The heating element 6 mixes 30 to 60% of the weight of iron powder, 9 to 25% of the weight of activated carbon, 3 to 20% of the weight of a vermiculite, 3 to 7% of the weight of potassium salt, and 15 to 25% of the weight of water, and is constituted. Instead of a vermiculite, the mixture of wood flour or wood flour, and a vermiculite may be used (it is hereafter considered as a "vermiculite etc."). The mixture of calcium salt or calcium salt, and potassium salt may be

used instead of potassium salt. Although what is necessary is just to mix by the above-mentioned weight ratio within the limits, iron powder, a vermiculite, etc. are preferred in respect of exothermic temperature and exothermic temporal duration, if it is made for the weight ratio of iron powder, a vermiculite, etc. to be set to 2:1-3:1.

#### 0033

The periphery edge and periphery edge of the 1st sheet 3 of each other are heat sealed so that the crevice 12 may be formed in the periphery of the heating element 6 with a wrap in the heating element 6, but adhesion by mere adhesives may be sufficient as the 2nd sheet 7. Width  $W_2$  of the base of the crevice 12 between the section right triangles currently formed in the longitudinal direction is 3 mm, and width  $L_2$  of the crevice 12 currently formed crosswise is 4 mm.

#### 0034

The adhesive layer 10 is formed all over almost **of the lower part side of the 1st sheet 3**. The releasing paper 11 is stuck so that the adhesive layer 10 may be covered, and the adhesive layer 10 is protected till use.

#### 0035

Supposing all the angles of volume  $V_1$  of the heating element 6 are not round at this time,

$$V_1 = W_1 \times L_1 \times H$$

It becomes.

#### 0036

If volume  $V_2$  of the crevice 12 disregards a corner part,

$$V_2 = (W_2 \times H \times 1/2 \times L_1 \times 2) + (L_2 \times H \times 1/2 \times W_1 \times 2)$$

It becomes.

#### 0037

If the above-mentioned numerical value is substituted for each variable here,

$$V_1 = 2400\text{-mm}^2$$

$$V_2 = 280\text{-mm}^2$$

It becomes.

#### 0038

Therefore, volume  $V_2$  of the crevice 12 becomes ten percent or more of volume  $V_1$  of the heating element 6.

#### 0039

The heating structure 1 constituted as mentioned above is provided in the state where it sealed to the outer bag formed with the air-impermeable film etc. And at the time of use, the outer bag which is not illustrated is opened, the heating structure 1 is taken out, the releasing paper 11 is removed, and adhesive layer 10 portion is stuck on the skin. Since the whole heating structure 1 becomes elastic with the 1st sheet 3 and the 2nd sheet 7 at this time, it becomes possible to hold a heating element to an adhesion condition irrespective of the gestalt of parts, such as a joint and a big muscular portion of elasticity, to be stuck. In particular, in this embodiment, since the heating structure 1 becomes elastic plate-like, the touch area of the heating structure 1 and a part to be stuck becomes large, and it becomes possible to stick a heating element of it broadly efficiently.

#### 0040

Drawing 3 is a mimetic diagram showing the deformation process by use of the heating structure shown by drawing 1, and is a figure corresponding to drawing 7 of conventional technology.

#### 0041

With reference to (1) of drawing 3, it differs in that the crevice 12 is formed in the periphery of the heating element 6 to the composition of the exothermic extensible body 61 by conventional technology. Since the composition of other heating structure 1 is the same as that of the thing of conventional technology, explanation here is not repeated.

#### 0042

The whole appearance top product of two or more lumps 16 which broke and arose by the oxidation reaction by use of the heating element 6 with reference to (2) of drawing 3 increases about ten percent by the usual crack compared with the volume of the heating element 6 before a reaction. However, since the crevice 12 which has a volume of ten percent or more of the heating element 6 as mentioned above is formed in the periphery of the heating element 6,

the amount of substantial increase of the lump 16 moves so that it may fit in the crevice 12.

**0043**

If constituted in this way, since the lump 16 is spread horizontally, the phenomenon in which the lump 16 extends the 1st sheet 3 and the 2nd sheet 7 up and down, and changes the shape of the heating structure 1 will reduce him. Therefore, the displeasure produced to the part which touches the 1st sheet 3 and the adhesive layer 10 to be stuck is reduced.

**0044**

Drawing 4 is a sectional view of the heating structure by a 2nd embodiment of this invention, and is a figure corresponding to drawing 2 of a 1st previous embodiment.

**0045**

With reference to the figure, the bottom of the side which the heating element 6 sticks among the components of the heating structure 1 by a 1st embodiment serves as truncated four-sided pyramid shape which becomes larger than the upper surface. And the angle which the wall surface and vertical plane of the heating element 6 make is set as 30 degrees. Although the sectional shape of the crevice 12 has been no longer a right triangle, it is set as the size that the volume  $V_2$  becomes ten percent or more of volume  $V_1$  of the heating element 6. Since the composition of other heating structure 1 is the same as that of the thing of a 1st embodiment, explanation here is not repeated.

**0046**

If constituted in this way, it can be hard to break the heating element 6 with the stable shape to external force. Therefore, since it becomes difficult to produce a fine lump after generation of heat, a substantial lump's increase in volume is controlled, and the degree of the shape change of the heating structure 1 after generation of heat can be lessened more.

**0047**

In a 1st above-mentioned embodiment, although the size of a heating element and the size of a crevice are specified, the volume of a crevice should just be a size which becomes ten percent or more of the volume of a heating element.

**0048**

In a 1st above-mentioned embodiment, it was formed so that all the angles of a heating element might have a curvature radius of 0.5 mm or more, but the curvature radius below this may be sufficient, and an angle does not need to be round.

**0049**

In a 2nd embodiment of the above, although the angle which consists of a side-attachment-wall flat surface of a heating element and a vertical plane was made into 30 degrees, and angles other than this may be sufficient, such a high effect is done so that it becomes a bigger angle.

**0050**

In a 1st embodiment of the above, and a 2nd embodiment, although the shape of the heating element was tabular **rectangular** or truncated four-sided pyramid shape, they may be shape other than this.

**0051**

In the 1st above-mentioned embodiment and 2nd embodiment, although the 1st sheet and the 2nd sheet should have elasticity, they can be applied also to what does not have elasticity and do the same effect so.

**Brief Description of the Drawings****0052**

**Drawing 1** It is a top view showing the outline composition of the heating structure by a 1st embodiment of this invention.

**Drawing 2** It is a sectional view of the II-II line shown by drawing 1.

**Drawing 3** It is a mimetic diagram showing the deformation process by use of the heating structure shown by drawing 1, and is a figure corresponding to drawing 7 of conventional technology.

**Drawing 4** It is a sectional view of the heating structure by a 2nd embodiment of this invention, and is a figure corresponding to drawing 2 of a 1st previous embodiment.

**Drawing 5** It is a top view showing the outline composition of the exothermic extensible body shown in the patent documents 1.

**Drawing 6** It is a sectional view of the VI-VI line shown by drawing 5.

**Drawing 7** It is a mimetic diagram showing the deformation process by use of the exothermic extensible body shown by drawing 5.

**Description of Notations****0053**

- 1 -- Heating structure
- 3 -- The 1st sheet
- 6 -- Heating element
- 7 -- The 2nd sheet
- 10 -- Adhesive layer
- 12 -- Crevice
- 16 -- Lump

Each identical codes in a figure show a same or considerable portion.

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## Field of the Invention

### 0001

About heating structure, especially this invention includes a heating element and relates to the heating structure used sticking on parts, such as the skin, to be stuck.

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## Background of the Invention

### 0002

It is used in order to stick on the skin directly and to carry out a warm temperature therapy to it, and the exothermic extensible body expanded and contracted so that a motion of the body of a joint part etc. may be followed is proposed.

### 0003

Drawing 5 is a top view showing the outline composition of the exothermic extensible body shown in the patent documents 1, and drawing 6 is a sectional view of the VI-VI line shown by drawing 5.

### 0004

With reference to these figures, the exothermic extensible body 61 comprises the 1st sheet 3, the 2nd pasted-up sheet 7, and the adhesive layer 10 applied to the lower part side of the 1st sheet 3, where the heating elements 6a-6c etc. which have been arranged in the upper face of the 1st sheet 3 and the 1st sheet 3, the heating elements 6a-6c, etc. are covered.

### 0005

The 1st sheet 3 pastes together the elastic nonwoven fabric 4 and the elastic air-impermeable film 5 with adhesives etc., and is constituted as a composite sheet which has elasticity. The 2nd sheet 7 is also constituted as a composite sheet which pastes together the nonwoven fabric 8 and the air-impermeable film 9, and has elasticity similarly. This 2nd sheet 7 is provided with breathability by two or more detailed holes formed in the film 9 all over almost with the needle etc.

### 0006

It consists of mixtures, such as iron powder, mineral salt, activated carbon, and water, for example, and iron oxidation reaction begins and generates heat by contact with air, and each, such as the heating elements 6a-6c, is tabular **of a plane view \*\*\*\* square**, and is arranged in the upper face of the 1st sheet 3 in the state where it aligned in the shape of a lattice in all directions.

### 0007

The 2nd sheet 7 is arranged so that these heating elements 6a-6c may be covered without a crevice, and the periphery edge and periphery edge of the 1st sheet 3 of each other are heat sealed (heat adhesion). The adhesive layer which a binder is applied and is not illustrated is formed in the portion except the periphery edge of the lower part side of the 2nd sheet 7, and the 1st sheet 3, the 2nd sheet 7, the heating elements 6a-6c, etc. are stuck and united with it.

### 0008

The binder 10 is applied to the direction outside the nonwoven fabric 4 of the 1st sheet 3. The releasing paper 11 is stuck so that this applied binder 10 may be covered, and the adhesive layer 10 is protected till use.

### 0009

The packing sheet tools which use Cairo as the same purpose as such an exothermic extensible body are also proposed (patent documents 2).

**Patent documents 1** JP,2006-51191,A

**Patent documents 2** JP,H6-26829,U



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**Effect of the Invention****0023**

As explained above, two or more lumps which arose from the heating element since two or more lumps which produced the invention according to claim 1 from the heating element were settled in the space of the periphery of a heating element stop extending the 1st sheet and the 2nd sheet up and down, and the feeling of GOTSUGOTSU to a part to be stuck is reduced.

**0024**

Since the external force added to an angle by all the angles of a heating element becoming round distributes in addition to the effect of the invention according to claim 1, the invention according to claim 2 becomes difficult to lack the angle of a heating element.

**0025**

Since a heating element serves as truncated four-sided pyramid shape as for which the bottom of the side stuck becomes larger than the upper surface in addition to the effect of the invention according to claim 1 or 2, the invention according to claim 3 becomes difficult to break a heating element.

**0026**

Since the whole heating structure has elasticity from Claim 1 in addition to the effect of the invention according to claim 3, heating structure becomes easy to follow the invention according to claim 4 at a motion of the crooked parts, such as a joint part, to be stuck.

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**Problem(s) to be Solved by the Invention****0010**

Drawing 7 is a mimetic diagram showing the deformation process by use of the exothermic extensible body shown by drawing 5.

**0011**

With reference to (1) of drawing 7, in the exothermic extensible body 61 before generation of heat, the heating element 6 is plate-like and the 1st sheet 3 and the adhesive layer 10 which touch a part to be stuck are maintaining the even state.

**0012**

With reference to (2) of drawing 7, in the exothermic extensible body 61 after generation of heat, the heating element 6 broke by oxidation reaction, two or more lumps 16 were produced, and the crevice has arisen between the united heating elements 6 before generation of heat. As a result, the lump's 16 whole appearance top product increases compared with the heating element 6, the 1st sheet 3 and the 2nd sheet 7 can extend it up and down with the lump 16, and unevenness produces it in the 1st sheet 3 and the adhesive layer 10 which were in the even state.

**0013**

Thus, in the conventional exothermic extensible body, in order that the lump which arises from a heating element might extend the 1st sheet and the 2nd sheet and might change the shape of an exothermic extensible body after generation of heat, it had become an unpleasant thing which makes a part to be stuck produce the sense of incongruity as for which a feeling of GOTSUGOTSU becomes. A sheet will generate this displeasure similarly, even if inelastic.

**0014**

This invention was made in order to solve above SUBJECT, and an object of an invention is for the degree of the shape change after generation of heat to provide little heating structure.

---

**Means for Solving the Problem****0015**

In order to attain the above-mentioned purpose, the invention according to claim 1, Are the heating structure used sticking on parts, such as the skin, to be stuck, and The 1st sheet-shaped sheet, A plate-like heating element which generates heat, hardens and produces two or more lumps by crack by **of the 1st sheet** being arranged on a field on the other hand, and contacting air, It is sheet shape, and it has breathability, and has the 2nd sheet pasted up on

the 1st sheet where a heating element is covered, and an adhesive layer formed on an another side side of the 1st sheet, and space which becomes ten percent or more of the volume of a heating element is formed in a periphery of a heating element.

**0016**

If constituted in this way, two or more lumps which arose from a heating element will be settled in space of the periphery of a heating element.

**0017**

As for the invention according to claim 2, in composition of the invention according to claim 1, a heating element is formed so that all the angles may have a curvature radius of 0.5 mm or more.

**0018**

If constituted in this way, all the angles of a heating element will become round, and external force added to an angle will distribute.

**0019**

The invention according to claim 3 has the truncated four-sided pyramid shape to which a heating element uses the 1st sheet side as the bottom in composition of the invention according to claim 1 or 2.

**0020**

If constituted in this way, a heating element will serve as truncated four-sided pyramid shape as for which the bottom of a side stuck becomes larger than the upper surface.

**0021**

In composition of the invention according to any one of claims 1 to 3, as for the invention according to claim 4, the 1st sheet and the 2nd sheet have elasticity.

**0022**

When constituted in this way, the whole heating structure has elasticity.

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**Brief Description of the Drawings****0052**

**Drawing 1** It is a top view showing the outline composition of the heating structure by a 1st embodiment of this invention.

**Drawing 2** It is a sectional view of the II-II line shown by drawing 1.

**Drawing 3** It is a mimetic diagram showing the deformation process by use of the heating structure shown by drawing 1, and is a figure corresponding to drawing 7 of conventional technology.

**Drawing 4** It is a sectional view of the heating structure by a 2nd embodiment of this invention, and is a figure corresponding to drawing 2 of a 1st previous embodiment.

**Drawing 5** It is a top view showing the outline composition of the exothermic extensible body shown in the patent documents 1.

**Drawing 6** It is a sectional view of the VI-VI line shown by drawing 5.

**Drawing 7** It is a mimetic diagram showing the deformation process by use of the exothermic extensible body shown by drawing 5.

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**Drawing 1**

For drawings please refer to the original document.

**Drawing 2**

For drawings please refer to the original document.

**Drawing 3**

For drawings please refer to the original document.

**Drawing 4**

For drawings please refer to the original document.

**Drawing 5**

For drawings please refer to the original document.

**Drawing 6**

For drawings please refer to the original document.

**Drawing 7**

For drawings please refer to the original document.

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For drawings please refer to the original document.

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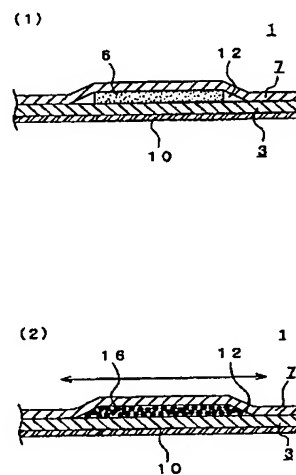
(54) 【発明の名称】 発熱構造体

(57) 【要約】

【課題】 発熱後の形状変化の度合いが少ない発熱構造体を提供する。

【解決手段】 発熱構造体 1 は、第 1 シート 3 と、第 1 シート 3 の上方面に配置された発熱体 6 と、発熱体 6 を覆った状態で第 1 シート 3 と接着された第 2 シート 7 と、第 1 シート 3 の下方面に塗布された粘着層 1 0 とから構成されている。尚、発熱体 6 の周縁には発熱体 6 の体積の 1 割以上の体積を有する隙間 1 2 が形成されている。このように構成すると、発熱体 6 が酸化反応による硬化によって割れて複数個の塊 1 6 を生じさせ、塊 1 6 の見かけ上の全体積が発熱体 6 に比べて増大しても、増大分は隙間 1 2 に収まる。すなわち、塊 1 6 全体が水平方向に拡散するため、第 1 シート 3 及び第 2 シート 7 を上下に押し広げる現象が低減される。その結果、発熱後に被貼付部位に生じていたゴツゴツとした不快感が軽減される。

【選択図】 図 3



## 【特許請求の範囲】

## 【請求項1】

皮膚等の被貼付部位に貼り付けて使用する発熱構造体であって、

シート形状の第1シートと、

前記第1シートの一方面上に配置され、空気と接触することによって発熱して硬化し、割れによって複数個の塊を生じさせる平板状の発熱体と、

シート形状であって、通気性を有し、前記発熱体を覆った状態で前記第1シートに接着される第2シートと、

前記第1シートの他方面上に形成された粘着層とを備え、

前記発熱体の周縁において、前記発熱体の体積の1割以上となる空間が形成された、発熱構造体。

## 【請求項2】

前記発熱体は、全ての角が0.5mm以上の曲率半径を有するように形成された、請求項1記載の発熱構造体。

## 【請求項3】

前記発熱体は、前記第1シート側を底面とする四角錐台形状を有する、請求項1または請求項2記載の発熱構造体。

## 【請求項4】

前記第1シート及び前記第2シートは、伸縮性を有する、請求項1から請求項3記載の発熱構造体。

## 【発明の詳細な説明】

## 【技術分野】

## 【0001】

この発明は発熱構造体に関し、特に発熱体を内包し、皮膚等の被貼付部位に貼り付けて使用される発熱構造体に関するものである。

## 【背景技術】

## 【0002】

皮膚に直接貼り付けて温熱治療をするために用いられ、関節部位等の体の動きに追従するように伸縮する発熱伸縮体が提案されている。

## 【0003】

図5は、特許文献1に示されている発熱伸縮体の概略構成を示した平面図であり、図6は、図5で示したV I - V I ラインの断面図である。

## 【0004】

これらの図を参照して、発熱伸縮体61は、第1シート3と、第1シート3の上方面に配置された発熱体6a~6c等と、発熱体6a~6c等を覆った状態で第1シート3と接着された第2シート7と、第1シート3の下方面に塗布された粘着層10とから構成されている。

## 【0005】

第1シート3は、伸縮性のある不織布4と伸縮性のある非通気性のフィルム5とを接着剤等で貼り合わせて、伸縮性を有する複合シートとして構成されている。また、第2シート7も同様に、不織布8と非通気性のフィルム9とを貼り合わせて伸縮性を有する複合シートとして構成されている。この第2シート7は、フィルム9に針等でほぼ全面に形成された複数の微細な孔によって、通気性を備えている。

## 【0006】

発熱体6a~6c等の各々は、例えば鉄粉、無機塩、活性炭、水等の混合物よりなり、空気との接触によって鉄の酸化反応が開始して発熱するものであって、平面視ほぼ正方形の板状で、縦横に格子状に整列した状態で第1シート3の上方面に配置されている。

## 【0007】

第2シート7は、これらの発熱体6a~6c等を隙間無く覆うように配置され、その外周縁と第1シート3の外周縁とが互いにヒートシール（熱接着）されている。尚、第2シ

ート7の下面の外周縁を除く部分には、粘着剤が塗布されて図示しない粘着層が形成されており、第1シート3と第2シート7と発熱体6 a～6 c等は密着して一体化されている。

【0008】

粘着剤10は、第1シート3の不織布4の外方面に塗布されている。尚、この塗布された粘着剤10を覆うように剥離紙11が貼り付けられ、使用時まで粘着層10が保護されている。

【0009】

尚、このような発熱伸縮体と同様の目的としてカイロを使用した湿布用具も提案されている(特許文献2)。

【特許文献1】特開2006-51191号公報

【特許文献2】実開平6-26829号公報

【発明の開示】

【発明が解決しようとする課題】

【0010】

図7は、図5で示した発熱伸縮体の使用による変形過程を示した模式図である。

【0011】

図7の(1)を参照して、発熱前の発熱伸縮体61においては、発熱体6は平板状であり、被貼付部位に接する第1シート3及び粘着層10は平らな状態を保っている。

【0012】

図7の(2)を参照して、発熱後の発熱伸縮体61においては、発熱体6が酸化反応によって割れて複数個の塊16を生じさせており、発熱前は一体となっていた発熱体6の間に隙間が生じている。その結果、塊16の見かけ上の全体積は発熱体6に比べて増大し、第1シート3及び第2シート7が塊16によって上下に押し広げられ、平らな状態であった第1シート3及び粘着層10に凹凸が生じる。

【0013】

このように従来の発熱伸縮体では、発熱後に発熱体より生じる塊が第1シート及び第2シートを押し広げて発熱伸縮体の形状を変化させるため、被貼付部位にゴツゴツ感なる違和感を生じさせる不快なものとなっていた。この不快感は、シートが伸縮性のないものであっても同様に発生することになる。

【0014】

この発明は、上記のような課題を解決するためになされたもので、発熱後の形状変化の度合いが少ない発熱構造体を提供することを目的とする。

【課題を解決するための手段】

【0015】

上記の目的を達成するために、請求項1記載の発明は、皮膚等の被貼付部位に貼り付けて使用する発熱構造体であって、シート形状の第1シートと、第1シートの一方面上に配置され、空気と接触することによって発熱して硬化し、割れによって複数個の塊を生じさせる平板状の発熱体と、シート形状であって、通気性を有し、発熱体を覆った状態で第1シートに接着される第2シートと、第1シートの他方面上に形成された粘着層とを備え、発熱体の周縁において、発熱体の体積の1割以上となる空間が形成されたものである。

【0016】

このように構成すると、発熱体から生じた複数個の塊が、発熱体周縁の空間に収まる。

【0017】

請求項2記載の発明は、請求項1記載の発明の構成において、発熱体は、全ての角が0.5mm以上の曲率半径を有するように形成されたものである。

【0018】

このように構成すると、発熱体の全ての角が丸くなり、角に加わる外力が分散する。

【0019】

請求項3記載の発明は、請求項1または請求項2記載の発明の構成において、発熱体は

、第1シート側を底面とする四角錐台形状を有するものである。

【0020】

このように構成すると、発熱体は貼り付けられる側の底面が上面より広くなる四角錐台形状となる。

【0021】

請求項4記載の発明は、請求項1から請求項3のいずれかに記載の発明の構成において、第1シート及び第2シートは、伸縮性を有するものである。

【0022】

このように構成すると、発熱構造体の全体が伸縮性を有する。

【発明の効果】

【0023】

以上説明したように、請求項1記載の発明は、発熱体から生じた複数の塊が、発熱体周縁の空間に収まるので、発熱体から生じた複数の塊が第1シート及び第2シートを上下に押し広げなくなり、被貼付部位に対するゴツゴツ感が軽減される。

【0024】

請求項2記載の発明は、請求項1記載の発明の効果に加えて、発熱体の全ての角が丸くなり、角に加わる外力が分散するので、発熱体の角が欠けにくくなる。

【0025】

請求項3記載の発明は、請求項1または請求項2記載の発明の効果に加えて、発熱体は貼り付けられる側の底面が上面より広くなる四角錐台形状となるので、発熱体が割れにくくなる。

【0026】

請求項4記載の発明は、請求項1から請求項3記載の発明の効果に加えて、発熱構造体の全体が伸縮性を有するので、発熱構造体が、関節部位などの屈曲した被貼付部位の動きに追従しやすくなる。

【発明を実施するための最良の形態】

【0027】

図1は、この発明の第1の実施の形態による発熱構造体の概略構成を示した平面図であり、図2は、図1で示したI I - I Iラインの断面図である。

【0028】

これらの図を参照して、発熱構造体1は、第1シート3と、第1シート3の上方面に配置された発熱体6と、発熱体6を覆った状態で第1シート3とヒートシールされた第2シート7と、第1シート3の下方面に塗布された粘着層10と粘着層10の下面に貼り付けられた剥離紙11とから構成されている。

【0029】

第1シート3は、例えばウレタン系の伸縮性のある不織布4と例えばウレタン系の伸縮性のある非通気性のフィルム5とを接着剤等で貼り合わせた複合シートとして構成されている。又、第2シート7も同様の不織布8と非通気性のフィルム9とを貼り合わせ、伸縮性のある複合シートとして構成されている。この第2シート7は、フィルム9に針等でほぼ全面に形成された複数の微細な孔によって、通気性を備えている。尚、第1シート3は通気性又は非通気性のいずれでも良いが、この実施の形態では非通気性シートとする。又、発熱構造体1の大きさは被貼付部位に応じて任意に設定することができるが、この実施の形態では長手方向（図1における上下方向）の寸法を50mm、幅方向（図1における左右方向）の寸法は120mmに設定されている。

【0030】

発熱体6は、全ての角が0.5mm以上の曲率半径を有する平面視長方形の板状であり、第1シート3の上方面に配置されている。発熱体6の縦幅 $L_1$ は30mmで、横幅 $W_1$ は40mmであり、厚みHは2mmに設定されている。

【0031】

このように構成すると、発熱体6の全ての角が丸くなり、外力が分散するので発熱体6

の角が欠けにくくなる。

【0032】

尚、発熱体6は、30～60重量%の鉄粉と、9～25重量%の活性炭と、3～20重量%のバーミキュライトと、3～7重量%のカリウム塩と、15～25重量%の水とを混合して構成されている。バーミキュライトの代わりに、木粉または木粉とバーミキュライトとの混合物を用いても良い(以下、「バーミキュライト等」とする)。また、カリウム塩の代わりに、カルシウム塩またはカルシウム塩とカリウム塩との混合物を用いても良い。鉄粉及びバーミキュライト等は、上記の範囲内の重量比で混合すれば良いが、鉄粉とバーミキュライト等との重量比が2:1～3:1となるようにすれば、発熱温度と発熱持続時間の面で好ましい。

【0033】

第2シート7は、発熱体6を覆うとともに発熱体6の周縁に隙間12が形成されるように、その外周縁と第1シート3の外周縁とが互いにヒートシールされているが、単なる接着剤による接着でも良い。尚、長手方向に形成されている断面直角三角形の隙間12の底辺の幅 $W_2$ は3mmであり、幅方向に形成されている隙間12の幅 $L_2$ は4mmである。

【0034】

粘着層10は、第1シート3の下面のほぼ全面に形成されている。尚、粘着層10を覆うように剥離紙11が貼り付けられ、使用時まで粘着層10が保護されている。

【0035】

このとき、発熱体6の体積 $V_1$ は全ての角が丸くないとすると、

$$V_1 = W_1 \times L_1 \times H$$

となる。

【0036】

隙間12の体積 $V_2$ はコーナー部分を無視すると、

$$V_2 = (W_2 \times H \times 1/2 \times L_1 \times 2) + (L_2 \times H \times 1/2 \times W_1 \times 2)$$

となる。

【0037】

ここで、各変数に上記の数値を代入すると、

$$V_1 = 2400 \text{ mm}^2$$

$$V_2 = 280 \text{ mm}^2$$

となる。

【0038】

したがって、隙間12の体積 $V_2$ は、発熱体6の体積 $V_1$ の1割以上となる。

【0039】

以上のように構成された発熱構造体1は、非通気性フィルム等で形成された外袋に密封した状態で提供されるものである。そして、使用時には、図示しない外袋を開封して発熱構造体1を取り出し、剥離紙11を剥がして粘着層10部分を皮膚に貼り付ける。このとき、第1シート3及び第2シート7により発熱構造体1の全体が伸縮自在となるため、関節や伸縮の大きな筋肉部分等の被貼付部位の形態にかかわらず、発熱体を密着状態に保持することが可能となる。特に、この実施の形態では、発熱構造体1が平板状で伸縮自在となるため、発熱構造体1と被貼付部位との接触面積が大きくなり、発熱体を効率的に広範囲に密着させることが可能となる。

【0040】

図3は、図1で示した発熱構造体の使用による変形過程を示した模式図であって、従来技術の図7に対応する図である。

【0041】

図3の(1)を参照して、従来技術による発熱伸縮体61の構成に対して、発熱体6の周縁には隙間12が形成されている点が異なっている。尚、他の発熱構造体1の構成は従来技術のものと同一であるため、ここでの説明は繰り返さない。

【0042】



図3の(2)を参照して、発熱体6の使用による酸化反応によって割れて生じた複数個の塊16の見かけ上の全体的は、反応前の発熱体6の体積に比べて通常の割れでは約1割程度増大する。ところが、上述のように発熱体6の1割以上の体積を有する隙間12が発熱体6の周縁に形成されているため、塊16の実質的な増大分は隙間12に収まるように移動する。

【0043】

このように構成すると、塊16は水平方向に拡散するため、塊16が第1シート3及び第2シート7を上下に押し広げて発熱構造体1の形状を変化させる現象が低減する。よって、第1シート3及び粘着層10と接する被貼付部位に生じる不快感が軽減される。

【0044】

図4は、この発明の第2の実施の形態による発熱構造体の断面図であって、先の第1の実施の形態の図2に対応する図である。

【0045】

図を参照して、第1の実施の形態による発熱構造体1の構成要素のうち、発熱体6が、貼り付ける側の底面が上面より広くなる四角錐台形状となっている。そして、発熱体6の側壁面と垂直面とがなす角度は30度に設定されている。隙間12の断面形状は直角三角形ではなくなっているが、その体積 $V_2$ が発熱体6の体積 $V_1$ の1割以上となるような寸法に設定されている。尚、他の発熱構造体1の構成は第1の実施の形態のものと同一であるため、ここでの説明は繰り返さない。

【0046】

このように構成すると、発熱体6はその安定形状により、外力に対して割れにくいものとなる。そのため、発熱後に細かな塊が生じにくくなるため実質的な塊の体積増加が抑制され、発熱後の発熱構造体1の形状変化の度合いをより少なくすることができる。

【0047】

尚、上記の第1の実施の形態においては、発熱体の寸法及び隙間の寸法を特定しているが、隙間の体積が発熱体の体積の1割以上となる寸法であればよい。

【0048】

又、上記の第1の実施の形態においては、発熱体の全ての角が0.5mm以上の曲率半径を有するように形成されていたが、これ未満の曲率半径でも良く、又、角は丸くなくてもよい。

【0049】

更に、上記第2の実施の形態においては、発熱体の側壁平面と垂直面とからなる角度を30度としていたが、これ以外の角度でも良いが、より大きな角度になるほど高い効果を奏する。

【0050】

更に、上記第1の実施の形態及び第2の実施の形態においては、発熱体の形状が長方形の板状又は四角錐台形状であったが、これ以外の形状であってもよい。

【0051】

更に、上記の第1の実施の形態及び第2の実施の形態においては、第1シート及び第2シートは伸縮性を有するものとしていたが、伸縮性を有さないものにも適用でき同様の効果を奏する。

【図面の簡単な説明】

【0052】

【図1】この発明の第1の実施の形態による発熱構造体の概略構成を示した平面図である。

【図2】図1で示したI-Iラインの断面図である。

【図3】図1で示した発熱構造体の使用による変形過程を示した模式図であって、従来技術の図7に対応する図である。

【図4】この発明の第2の実施の形態による発熱構造体の断面図であって、先の第1の実施の形態の図2に対応する図である。

【図5】特許文献1に示されている発熱伸縮体の概略構成を示した平面図である。

【図6】図5で示したV I－V Iラインの断面図である。

【図7】図5で示した発熱伸縮体の使用による変形過程を示した模式図である。

【符号の説明】

【0053】

1…発熱構造体

3…第1シート

6…発熱体

7…第2シート

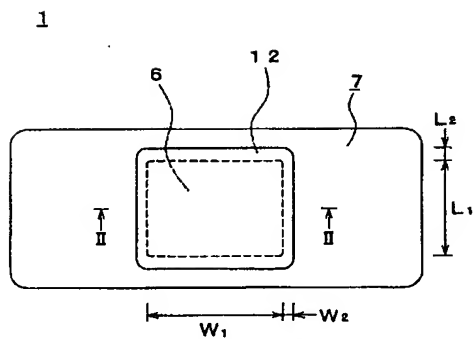
10…粘着層

12…隙間

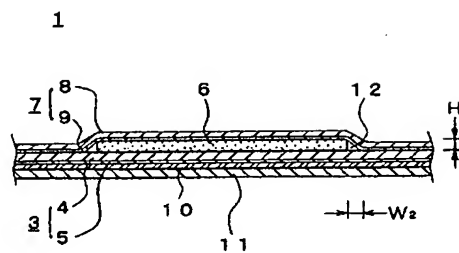
16…塊

尚、各図中同一符号は同一又は相当部分を示す。

【図1】



【図2】





【図7】

